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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/833,543	04/11/2001	Erik D. Lindskog	A-69116/AJT	4785
22918	7590	09/01/2006	EXAMINER	
PERKINS COIE LLP			WANG, TED M	
P.O. BOX 2168			ART UNIT	
MENLO PARK, CA 94026			PAPER NUMBER	

2611

DATE MAILED: 09/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/833,543

Applicant(s)

LINDSKOG ET AL.

Examiner

Ted M. Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-10, 15-20, 22-25, 27 and 37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-20, 22-25, 27 and 37 is/are allowed.
- 6) ☒ Claim(s) 2-4 is/are rejected.
- 7) ☒ Claim(s) 5-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on Aug. 15, 2006 has been entered.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on Aug. 15, 2006. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Arguments

3. The indicated allowability of claims 2-4 is withdrawn in view of the newly filed information disclosure statement (IDS), WO 00/14921, submitted on Aug. 15, 2006. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the

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subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Calderbank et al. (WO 00/14921) in view of Jones et al. (US 6,128,351).

- With regard claim 2, Calderbank et al. discloses a method of transmitting a signal of the type comprising a sequence of symbols (Fig.1 element 13 and 14) over spaced antennas (Fig.1 element 11 and 12) comprising the steps of:

dividing a transmission frame into first and second blocks (page 7, lines 13-14);

processing the sequence of symbols to generate first, second, third, and fourth symbol sequences (Fig.2 element 13, C_1 , C_2 , C_1^* and $-C_2^*$) so that some of the symbols in at least one of the symbol sequences are complex conjugated (Fig.2 element 13, C_1^*), and some of the symbols in at least one of the symbol sequences are negated and (Fig.2 element 13, $-C_2^*$), the third symbol sequence (Fig.2 element 13, C_1^*) corresponding to the first symbol sequence and the fourth symbol sequence corresponding to the second symbol sequence (Fig.2 element 13, $-C_2^*$), and;

during the first block of the transmission frame, applying the first symbol sequence to a first antenna (page 7, lines 14-17) and the second symbol sequence to a second antenna (page 7, lines 17-18) and during the second block of the transmission frame (page 7, line 18) applying the fourth symbol sequence

to the first antenna (page 7, lines 19-20) and the third symbol sequence to the second antenna (page 7, lines 18-19).

Calderbank et al. discloses all of the subject matter as described in the above paragraph except for specifically teaching some of the symbols in at least one of the symbol sequences are time-reversed.

However, Jones et al. teaches that some of the symbols in at least one of the symbol sequences are time-reversed (Fig.4 elements 68-70, column 1 lines 52-57, column 2 lines 17-21 and column 4 lines 48-53).

Jones et al. further teaches that the use of the matched filter characteristics (time-reversed) is that large peak envelope powers (PEPs) are unmatched by the matched filters 68-70, whereas the intervening, relatively small signal perturbations are matched and therefore enhanced (in terms of amplitude) so that it provides a significant performance advantage over existing multicarrier systems, with simulated results showing an improvement in the range of 3 dB and greater (column 4 line 66 –column 5 line 6).

Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by Jones et al. in which some of the symbols in at least one of the symbol sequences are time-reversed, into Calderbanks' develop block code generation circuit so as to improve the performance as described in the above paragraph.

- With regard claim 3, Calderbank et al. further discloses wherein processing the sequence of symbols comprises dividing the sequence of symbols to obtain the

first and the second symbol sequences (page 7, lines 13-14, where first symbol sequence is C_1 and the second symbols sequence is C_2), processing the first symbol sequence to obtain the third symbol sequence (Fig.2 element 13, C_1^* and page 7, lines 19-20), and processing the second symbol sequence to obtain the fourth symbol sequence (Fig.2 element 13, $-C_2^*$ and page 7, lines 18-19).

- With regard claim 4, which is a transmitter claim related to claim1, Jones et al. further teaches the operational control of the multicarrier transmitter is performed by a microprocessor (not shown), as will be readily understood. Also, the skilled addressee will appreciate that the inverse FFT function would typically be implemented within an Application Specific Integrated Circuit (ASIC) containing a microprocessor engine (column 4 lines 32-38). One skilled in the art would have clearly recognized that the processor as taught by Jones et al. would perform same function of the discrete hardware for less expense, adaptability, and flexibility. Therefore, it would have been obvious to have used the processor for implementing **“the claim 1 method as described in the above paragraph”** as taught by Jones et al. in order to reduce cost and improve the adaptability and flexibility of the communication system.

Allowable Subject Matter

6. Claims 15-20, 22-25, 27 and 37 are allowed.
7. Claims 5-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome the objection(s) set forth in this Office action

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and rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is an examiner's statement of reasons for allowance.

- The prior art fails to teach an apparatus of Claims 2, 4, 15, 19, and 37 that specifically comprises the following:

-- The instant application is deemed to be directed to a non-obvious improvement over the admitted prior art of the instant application and the invention patented in Pat. No. 6,128,351, 6,594,226, 6,697,641 and Ariyavisitakul, "A Decision Feedback Equalizer with Time-Reversal Structure", IEEE Journal on selected area in communications, vol. 10, No. 3, April 1992, and WO 00/14921. The improvement comprises-

With regard claims 15 and 19, "to transmit through the second antenna (group) a time reversed and complex conjugate form of the first symbol stream during a second block of the transmission frame, and to transmit through the first antenna (group) a time reversed, complex conjugate and negated form of the second symbol stream during the second block of the transmission frame." as recited, and

With regard claim 37, "each of the first and second symbol streams and that correlation between symbols close to each other in each of the first and second symbol streams is not significantly effected; and processing the plurality of symbol streams before transmitting each symbol stream through a channel, wherein processing the plurality of symbol streams

comprises time-reversing at least one of the symbol streams before transmitting the at least one of the processed symbol streams." as recited.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M. Wang



Ted M Wang
Examiner
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